

$\Sigma(1690)$ Bumps

$$I(J^P) = 1(?^?) \quad \text{Status: } **$$

OMITTED FROM SUMMARY TABLE

See the note preceding the $\Sigma(1670)$ Listings. Seen in production experiments only, mainly in $\Lambda\pi$.

$\Sigma(1690)$ MASS (PRODUCTION EXPERIMENTS)

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
≈ 1690 OUR ESTIMATE					
1698 \pm 20	70	1 GODDARD	79 HBC	+	$\pi^+ p$ 10.3 GeV/c
1707 \pm 20	40	2 GODDARD	79 HBC	+	$\pi^+ p$ 10.3 GeV/c
1698 \pm 20	15	ADERHOLZ	69 HBC	+	$\pi^+ p$ 8 GeV/c
1682 \pm 2	46	BLUMENFELD	69 HBC	+	$K_L^0 p$
1700 \pm 20		MOTT	69 HBC	+	$K^- p$ 5.5 GeV/c
1694 \pm 24	60	3 PRIMER	68 HBC	+	$K^- p$ 4.6–5 GeV/c
1700 \pm 6		4 SIMS	68 HBC	-	$K^- N \rightarrow \Lambda\pi\pi$
1715 \pm 12	30	COLLEY	67 HBC	+	$K^- p$ 6 GeV/c

$\Sigma(1690)$ WIDTH (PRODUCTION EXPERIMENTS)

<u>VALUE (MeV)</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
240 \pm 60	70	1 GODDARD	79 HBC	+	$\pi^+ p$ 10.3 GeV/c
130 $^{+100}_{-60}$	40	2 GODDARD	79 HBC	+	$\pi^+ p$ 10.3 GeV/c
142 \pm 40	15	ADERHOLZ	69 HBC	+	$\pi^+ p$ 8 GeV/c
25 \pm 10	46	BLUMENFELD	69 HBC	+	$K_L^0 p$
130 \pm 25		MOTT	69 HBC	+	$K^- p$ 5.5 GeV/c
105 \pm 35	60	3 PRIMER	68 HBC	+	$K^- p$ 4.6–5 GeV/c
62 \pm 14		4 SIMS	68 HBC	-	$K^- N \rightarrow \Lambda\pi\pi$
100 \pm 35	30	COLLEY	67 HBC	+	$K^- p$ 6 GeV/c

$\Sigma(1690)$ DECAY MODES (PRODUCTION EXPERIMENTS)

Mode
$\Gamma_1 \quad N\bar{K}$
$\Gamma_2 \quad \Lambda\pi$
$\Gamma_3 \quad \Sigma\pi$
$\Gamma_4 \quad \Sigma(1385)\pi$
$\Gamma_5 \quad \Lambda\pi\pi$ (including $\Sigma(1385)\pi$)

$\Sigma(1690)$ BRANCHING RATIOS (PRODUCTION EXPERIMENTS)

$\Gamma(N\bar{K})/\Gamma(\Lambda\pi)$						Γ_1/Γ_2
<u>VALUE</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>	
small		GODDARD	79	HBC	+	$\pi^+ p$ 10.2 GeV/c
<0.2		MOTT	69	HBC	+	$K^- p$ 5.5 GeV/c
0.4 ± 0.25	18	COLLEY	67	HBC	+	6/30 events

$\Gamma(\Sigma\pi)/\Gamma(\Lambda\pi)$						Γ_3/Γ_2
<u>VALUE</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>	
small		GODDARD	79	HBC	+	$\pi^+ p$ 10.2 GeV/c
<0.4	90	MOTT	69	HBC	+	$K^- p$ 5.5 GeV/c
0.3 ± 0.3		COLLEY	67	HBC	+	4/30 events

$\Gamma(\Sigma(1385)\pi)/\Gamma(\Lambda\pi)$						Γ_4/Γ_2
<u>VALUE</u>		<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>	
<0.5		MOTT	69	HBC	+	$K^- p$ 5.5 GeV/c

$\Gamma(\Lambda\pi\pi(\text{including } \Sigma(1385)\pi))/\Gamma(\Lambda\pi)$						Γ_5/Γ_2
<u>VALUE</u>		<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>	
2.0 ± 0.6		BLUMENFELD	69	HBC	+	31/15 events
0.5 ± 0.25		COLLEY	67	HBC	+	15/30 events

$\Gamma(\Sigma(1385)\pi)/\Gamma(\Lambda\pi\pi(\text{including } \Sigma(1385)\pi))$						Γ_4/Γ_5
<u>VALUE</u>		<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>	
large		SIMS	68	HBC	-	$K^- N \rightarrow \Lambda\pi\pi$
small		COLLEY	67	HBC	+	$K^- p$ 6 GeV/c

$\Sigma(1690)$ FOOTNOTES (PRODUCTION EXPERIMENTS)

- ¹ From $\pi^+ p \rightarrow (\Lambda\pi^+)K^+$. $J > 1/2$ is not required by the data.
- ² From $\pi^+ p \rightarrow (\Lambda\pi^+)(K\pi)^+$. $J > 1/2$ is indicated, but large background precludes a definite conclusion.
- ³ See the $\Sigma(1670)$ Listings. AGUILAR-BENITEZ 70B with three times the data of PRIMER 68 find no evidence for the $\Sigma(1690)$.
- ⁴ This analysis, which is difficult and requires several assumptions and shows no unambiguous $\Sigma(1690)$ signal, suggests $J^P = 5/2^+$. Such a state would lead all previously known Y^* trajectories.

$\Sigma(1690)$ REFERENCES (PRODUCTION EXPERIMENTS)

GODDARD	79	PR D19 1350	+Key, Luste, Prentice, Yoon, Gordon+	(TNTO, BNL) IJ
AGUILAR-...	70B	PRL 25 58	Aguilar-Benitez, Barnes, Bassano+	(BNL, SYRA)
ADERHOLZ	69	NP B11 259	+Bartsch+	(AACH3, BERL, CERN, JAGL, WARS) I
BLUMENFELD	69	PL 29B 58	+Kalbfleisch	(BNL) I
MOTT	69	PR 177 1966	+Ammar, Davis, Kropac, Slate+	(NWES, ANL) I
Also	67	PRL 18 266	Derrick, Fields, Loken, Ammar+	(ANL, NWES) I
PRIMER	68	PRL 20 610	+Goldberg, Jaeger, Barnes, Dornan+	(SYRA, BNL) I
SIMS	68	PRL 21 1413	+Albright, Bartley, Meer+	(FSU, TUFTS, BRAN) I
COLLEY	67	PL 24B 489		(BIRM, GLAS, LOIC, MUNI, OXF, RHEL) I